

The huge cost of handling and transporting concrete on the job could probably be cut considerably if we took full advantage of . . .

POWER BUGGIES



EVER SINCE THE PYRAMIDS were constructed the Number 1 building cost and the Number 1 building problem has been materials handling—getting heavy building materials to the place where they will actually be used in a structure. And while tremendous progress has been made in almost every other area of construction work, builders have been strangely slow to jump in with both feet to grapple with this most expensive problem of all. In an overwhelming number of cases we are still handling materials as we did when the Pyramids were built—by hand.

How much is this costing? Some educated guesses have been made. The magazine *House and Home*, while contending that today the building industry moves more heavy materials than any other industry except steel, says that efficient materials handling could save at least \$1 billion a year. (For example, mortar that costs \$1.60 to move by hand can be transported by power equipment for 29 cents.) Beyond doubt, a large share of this waste takes place in the handling of concrete.

This is in the face of the fact that great strides have been made by the manufacturers of power equipment to cut down time and cost required in the handling of concrete. The huge cost of materials handling in the construction industry could probably be cut in half if we took full advantage of all the better handling equipment and methods now available. The more we mechanize materials handling, the larger the loads we can lift and carry, the fewer the trips needed, and the smaller the working crew required.

One of the most promising equipment developments for handling concrete on the job is the power buggy. Perhaps a dozen manufacturers of power equipment now offer well-established lines of power buggies, and current models are a far-cry from the first crude machines which were offered to the construction industry. In an effort to assemble as much information on the subject as possible, CONCRETE CONSTRUCTION sent a questionnaire to manufacturers of this type of equipment.

The various units concerning which information was received are described and pictured on the Equipment, Tools & Materials pages of this issue. Like almost all such presentations, this one does not cover all the concrete buggies now on the market, but it does

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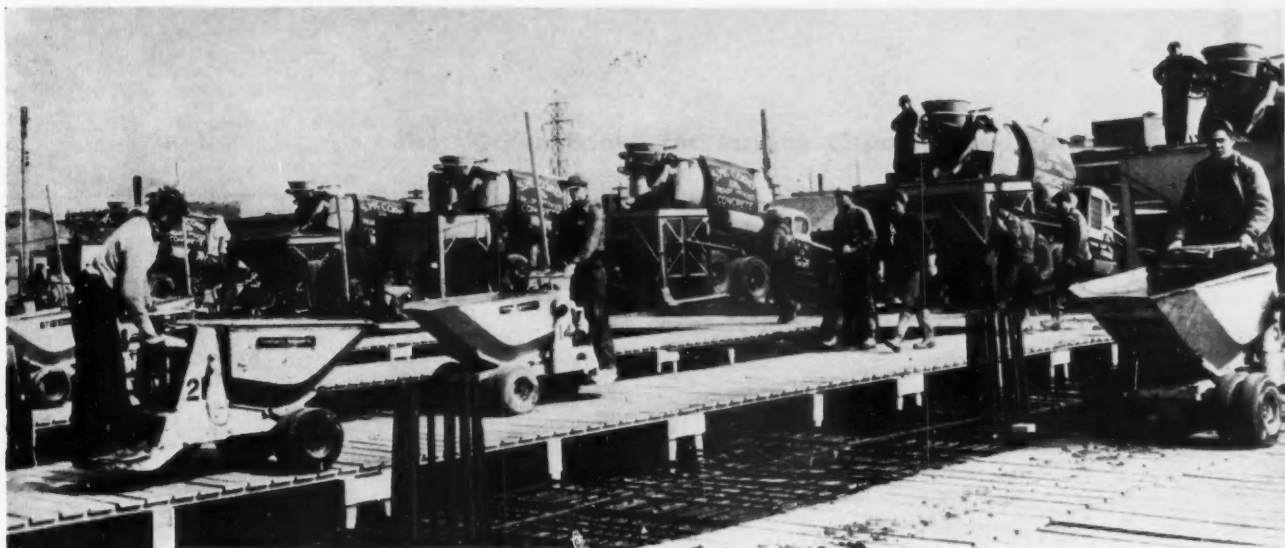
EVER SINCE THE PYRAMIDS were constructed the Number 1 building cost and the Number 1 building problem has been materials handling—getting heavy building materials to the place where they will actually be used in a structure. And while tremendous progress has been made in almost every other area of construction work, builders have been strangely slow to jump in with both feet to grapple with this most expensive problem of all. In an overwhelming number of cases we are still handling materials as we did when the Pyramids were built—by hand.

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A fleet of power buggies carries the concrete quickly and efficiently from truck to place of pouring.

include all the manufacturers who responded to our survey. There undoubtedly are other entirely satisfactory makes that do not appear on our equipment pages. In any case, it should go without saying that all makes should be carefully investigated to discover which best fits the needs of the individual builder.

Contractors who have made the switch to power buggies report some impressive cost advantages, and the picture is surprisingly uniform regardless of the make or type of equipment. One such report involves a school job for which it was necessary to pour 3,000 cubic yards of concrete on three floors. On the ground floor concrete was poured without the necessity of special runways and without interfering with other workmen. Construction of a 22 per cent ramp permitted upper floor work to be handled with the same efficiency as work on the ground floor. With the power buggies it was possible to make round trips of a thousand feet in less than six minutes. The contractor's records show that concrete was placed and other materials hauled at about one-third the cost of doing it any other way. Power buggies purchased especially for this job quickly paid for themselves.

Another school contractor reports

averaging as high as 75 cubic yards of concrete per hour for periods of 4 to 5 hours with a fleet of five power buggies. In this case the motorized equipment enabled him to beat his contract time by almost a month on a million dollar structure.

Although many concrete contractors have been quick to take advantage of new construction methods, there are still a great many who are slow to

modernize, especially when it comes to materials handling. Facing every contractor who considers mechanizing is the gnawing question of cost: will the necessary investment in equipment pay off in savings on the job? Experience shows that it has in almost every other phase of construction work. There is nothing to indicate that it won't in this last bastion of hand operation as well. END



Upper level construction work proceeds at a rapid pace with power buggies on the job.

Diplomat in Shirt Sleeves

The smart job superintendent knows and meets the needs of his men.



HE DOESN'T WEAR a silk hat and mingle with politicians in high places, but the job superintendent, if he's smart, is every inch a diplomat. Sure, he's concerned primarily with construction details, work progress, equipment and materials. But he is also concerned with his men. The time he gives to morale problems or to meetings with business agents is not wasted when a smoother operation is the result. His problem is not whether to give time, but how much time to give. He solves this problem by being well informed and thoroughly prepared before starting any job.

He knows the rules of the game.

First thing he does is get hold of the agreements between contractors and unions in the area where the job is located. He studies these agreements, including the fine print. Then when he's ready to hire the members of a particular union, he knows the salary level, working conditions, overtime provisions, and any special benefits the men are entitled to. He also checks with the local contractors association or the head of the building trades council to make sure the right men are assigned to the right jobs.

A lot of disputes are avoided this way. Suppose a labor agreement calls for free transportation to job sites that are a certain number of miles outside of town. If the superintendent neglects or ignores this provision, he's in for delay and trouble. He may find himself on the job bright and early the first morning—and alone! The men simply don't show up. On the other hand, if he reads and under-

stands what's expected of him, he'll make sure that cars and trucks are provided and that a satisfied crew arrives on time and ready to dig in.

The super-in-the-know watches for all kinds of provisions in the agreements. If a certain piece of equipment calls for two men operating it, he puts two men on the job, not one. If a certain operation calls for high-priced labor, he doesn't try to get by with men earning a lower rate of pay. He never discriminates against a job applicant, nor does he fire a man just because the union tells him to do so.

He's familiar with the "Green Book." One of the biggest headaches a superintendent faces is the jurisdictional dispute. This is a dispute between two or more unions over which trades get which work assignments. Since this kind of trouble seems to rear its ugly head over and over again, certain practices have been established for the settlement of jurisdictional disputes. These practices, or procedures, are contained in a small booklet called the "Green Book." It's issued by the Building and Construction Trades Department of the federal government. (Copies to be had by writing the Building Trades Department, 901 Massachusetts Avenue, Washington, D. C., or your local contractors association. Just ask for the "Green Book.")

Besides explaining the procedure for settling jurisdictional disputes, the Green Book contains a complete history of the decisions or agreements reached in past disputes in all sections of the country.

The smart job super keeps a copy

The "Green Book" for settling disputes is within reach.

He provides for the comfort and safety of his men.

He's thoroughly versed in local labor agreements.

The local labor representative is his ally.

of the Green Book with him all the time. He avoids many a jurisdictional dispute or work stoppage simply by checking this source to see how similar work assignments were made elsewhere in the country. Even if he can't find a decision to cover the work, he will at least find a clear procedure to follow in making assignments.

When all else fails and a work stoppage occurs, the super's last resort is to call on the National Joint Board for the Settlement of Jurisdictional Disputes. This Board was established by an agreement between the unions and various contractors associations throughout the country. He contacts the chairman at 901 Massachusetts Avenue in Washington and furnishes the following information:

1. name and address of contractor
2. description of job and location
3. description of work in dispute
4. trade union or unions in dispute or on strike
5. steps taken by superintendent in making the assignment
6. steps taken by superintendent to adjust the dispute.

Meanwhile, he continues the work in dispute with the original trade assigned to handle it, provided, of course, there is no strike. When the decision is reached, he abides by it.

He gets along with the union. Getting along with people is mostly a matter of getting to know them. For the job super this especially holds true for the union representative. As spokesman for the men who will be hired

for the job, the representative affects the speed and quality of their work. He is one man the diplomatic superintendent wants on his side. It's far better for the two to meet and talk on a get-acquainted basis than to wait until a dispute arises and brings them together. Moreover, by talking things over before starting a job, the superintendent can get some valuable information on local labor conditions. And he can straighten out any provisions in the labor agreement that seem foggy or unfair.

Even after the job is under way, the superintendent does well to lend an ear whenever the business agent wants to talk something over. If it means an interruption of work progress, the super can always arrange a time more convenient. Lunch provides an especially pleasant atmosphere for ironing out problems.

In all his dealings with union officials, the superintendent must be scrupulously honest. It is one thing to express an honest disagreement and quite another to distort the facts. The first will always bring the super respect and a reputation for fair dealing. The second breeds distrust and trouble.

The super is on safe grounds as long as he follows the provisions of the labor agreement. If the business agent chooses to ignore this agreement, the super can call upon the international union to come in and straighten him out.

Sometimes things get rough and tempers flare. However, the diplomatic superintendent always counts to ten and holds his tongue. He knows that

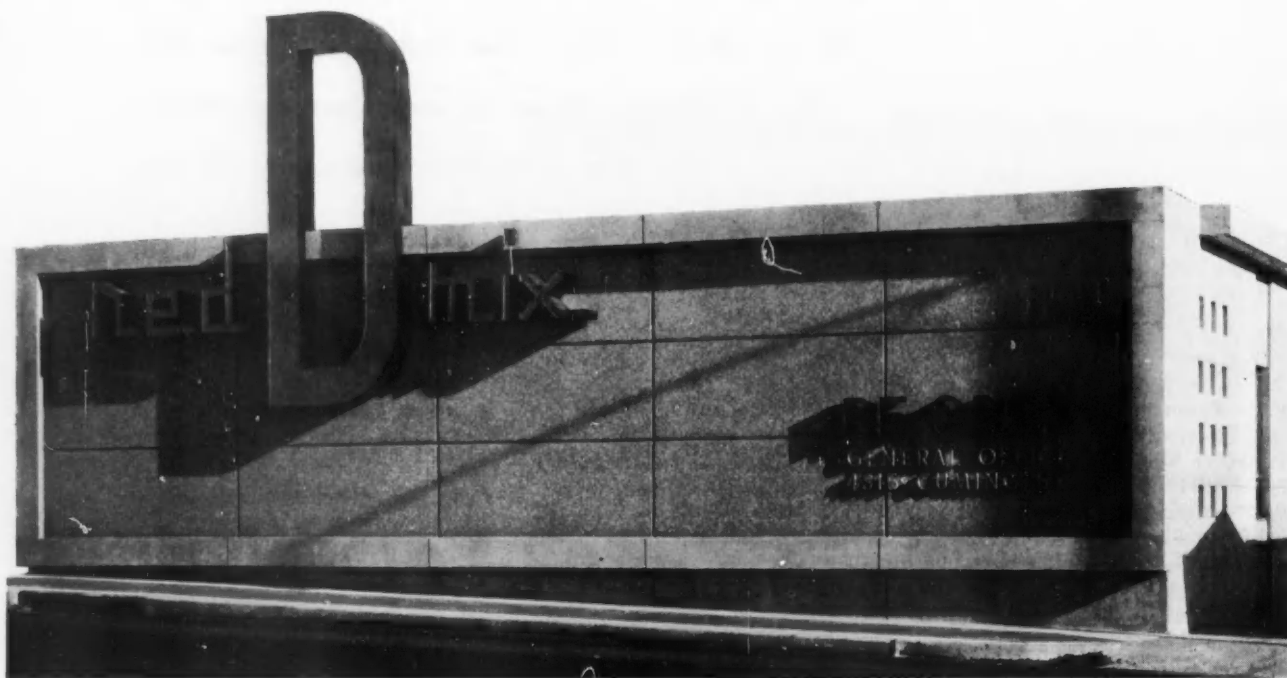
a personal insult hurled at a union representative can ruin any chance for future cooperation.

He gets along with his men by being sensitive to their need for comfort and safety. It usually takes so little to provide the things that are needed. Ignoring these needs, on the other hand, can bring on all the little grievances that eventually lead to poor production. For instance, take a construction job in progress during the chilly blasts of late November weather. There's no building erected yet, just a foundation, and hence no shelter for the men. By throwing up a quick makeshift shack, the super can earn the gratitude and loyalty of his men.

Little things like this—convenient parking facilities, toilet facilities, adequate storage space for tools—pay off in high worker morale and efficiency.

Safety is being preached and promoted everywhere. The unions are preaching it in their magazines. The smart job super practices it. If he doesn't, he can get in trouble with the insurance company, state and federal inspectors, the union, and with his men. The men don't like to take jobs where safety precautions are not observed. As the word is passed around, a contractor can get a bad reputation that leads to labor turnover.

The superintendent who makes it part of his job to understand and get along with the union and to see that his men are satisfied will be successful, not sorry. He may never be winned and dined by the National Joint Board in Washington, but he is nevertheless a diplomat in shirt sleeves. **END**



The exposed aggregate wall of this ready-mix office in Omaha was cast face down and tilted into position after it had cured. The wall contains mostly cactus green marble aggregate with some silver gray and red.

Through a technique called

"aggregate transfer," you can achieve . . .

Color and Texture in Concrete Surfaces

ALTHOUGH THERE ARE SEVERAL ways of obtaining an exposed decorative aggregate facing on precast concrete panels, there seems to be at present only one practical method of achieving such a facing on cast-in-place concrete surfaces: namely aggregate transfer.

The aggregate transfer method is actually quite simple and straight-forward. It consists basically of: (1) preparation of a form liner by "gluing" a single layer of decorative aggregate on a sheet of plywood; (2) attaching the liner to the interior of the forms and pouring the concrete; and (3) stripping the forms and liners after the concrete has cured. Since the bond of the aggregate to the concrete is greater than to the glue, the aggregate layer is transferred to the concrete surface.

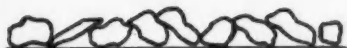
Choice of Aggregate

Like many other simple procedures, however, there are some tricks of the trade that can make the difference between success and something short of success. Since one is taking the time to expose a layer of aggregate, it should be proven first that the aggregate will deliver the desired effect. To this end, it is common practice for architects to ask contractors to prepare test slabs with various colors and/or types of aggregates.

Experience has shown that the most pleasing colors are achieved by adding one or more subsidiary colored aggregates to the basic shade. Surfaces consisting of a single color lack clarity and, strangely enough, purity. White cement also produces sharper colors.

White aggregates have been used on several jobs but the results have generally been somewhat disappointing for the resulting surfaces look like ordinary white concrete except when examined closely.

If the surface is to be buffed after the transfer, it is important to determine the ability of the aggregate to withstand abrasion. To assure a complete transfer, aggregate should be spherical or cubical; flats and slivers tend to become embedded in the concrete or fail to transfer because of poor bond. (See drawing.)



Poorly shaped, unvibrated aggregate becomes buried in the concrete or transfers poorly.



Thoroughly vibrated spherical or cubical aggregate transfers well and achieves an excellent reveal.

Under present market conditions, marble chips are usually adjudged the most practical choice for aggregate transfer projects. Manufactured ceramic and glass aggregates offer more brilliant and varied colors but their cost is several times that of marble chips. Perhaps increased demand will in time lower their price; at present, however, their use is generally restricted to relatively small decorative areas.



When a fast-drying adhesive is employed, the aggregate should be applied to the plywood liner immediately after the adhesive has been brushed on.

A view of the finished form. Aggregate liners have been securely fastened to the forms and reinforcement is in place.



Preparing the Liner

One of the advantages of aggregate transfer is its need for only a single layer of aggregate—an advantage that can be very appealing when one is dealing with some of the higher priced aggregates. However, this makes it necessary to achieve as nearly complete transfer as is possible since filling blank spots is usually a time and labor consuming task. As has been mentioned, aggregate shape has an important bearing on securing a good transfer. Hand in hand with this factor goes proper preparation of the liner.

The most commonly used base for such liners is a sheet of 1/4-inch plywood. On this sheet is spread a layer of adhesive. The adhesive can be made of nitro-cellulose, dammar gum and acetate; or any high-solids lacquer (15-20 per cent solids) can be used.

Next comes the layer of aggregate. The layer should give as complete a

coverage of the entire surface as is possible in a single layer. As it is important to get a thorough covering to the very ends of the liner, a V-shaped trough applicator that is slightly wider than the liner is often used. Any aggregate dropped over the edges can be recovered easily.

At this point it is important to vibrate the liner thoroughly in the horizontal direction. This assures an even layer of aggregate with off-shaped particles placed to best advantage.

After the adhesive has had time to harden, at least over night, the liner may be attached to the forms. Finishing brads seem to offer the most practical way of attaching the liners for they make it possible for forms to be stripped without damage to the liners. Naturally, forms must be sufficiently sturdy to minimize the possibility of the liners buckling.

Complete vibration of the concrete

(at no more than 12-inch intervals) is necessary to achieve adequate bond of concrete to the aggregate. Liners should be left in place as long as possible (even after forms have been removed, if possible) for they aid in properly curing the concrete.

The Finishing Touches

Liners can be removed by simply peeling them back off the concrete surface. Careful use of a 2 by 4 as a wedge can prove helpful when a particularly stubborn patch of adhesive tries muscles and tempers. And there you have it . . . a colorful, maintenance-free exposed aggregate surface.

Perfectionists, however, will want to add a finishing touch or two. Sand-blasting will remove the adhesive, cut back the concrete matrix, and enhance the color of the aggregate. Wire brushing or grinding will produce a terrazzo-like surface.

This panel shows an unpolished aggregate transfer surface.

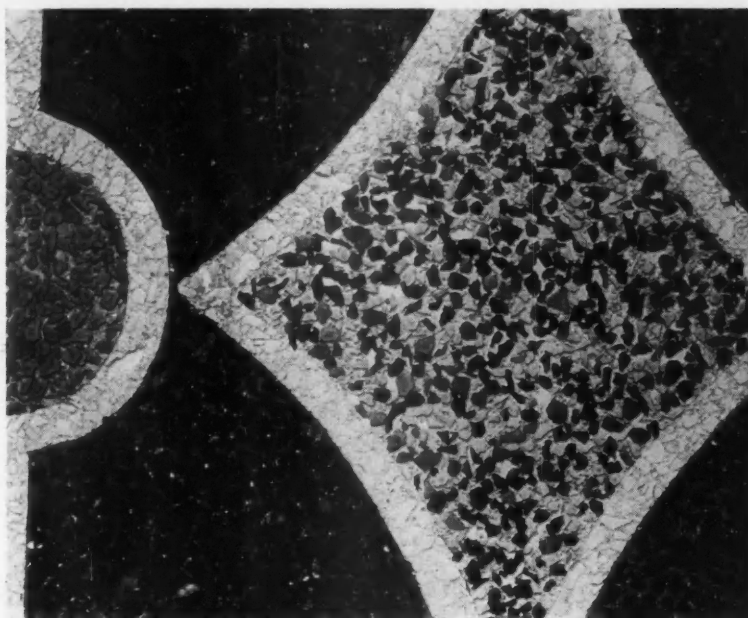


Some contractors use a mixture of one-half perlite and one-half adhesive (by volume). When this is spread on the liner about $\frac{3}{16}$ of an inch thick, greater aggregate reveal is achieved. Brushing or washing the perlite from the surface is then the only finishing required. This method is particularly valuable when a very rough surface is desired or an aggregate of low abrasion tolerance is employed.

It is hoped that the liberal sprinkling of carefals, cautions, necessarys, and soon, in this article will not deter you from trying aggregate transfer. It can, and has, produced many handsome architectural accents that have proven to be a source of pride to designers, contractors and owners.

Perhaps you already have worked with aggregate transfer and can teach us a trick or two. If you can, why not share them with us and our other readers?

END



Designs such as this can be achieved by the use of thin wood strips to delineate the various areas.

This polished aggregate surface offers a sharp contrast in texture to the panel at the left.





Excessive cracking has destroyed most of this driveway's usefulness.

Cracked Concrete —Whose Liability?

CONCRETE CONTRACTORS are frequently plagued by the problem of cracks. Assuming that cracking cannot be completely eliminated—either from an economical or practical standpoint—the next most important question concerns the contractor's liability.

Can the contractor be held liable in damages for cracks in the concrete foundation or flat work he furnished for a building? As usual in such legal questions, the answer is, "Maybe! It all depends."

An example from an actual case points up the general legal rule of liability. In a close case, for instance, it may depend on whether a jury is sympathetic to a home owner as against a contractor, as juries often are. It may depend on whether the contractor can prove that he warned the owner that the driveway might develop cracks if reinforcing fabric was not included. Human nature being what it is, it may even depend on whether or not the judge's driveway has any cracks in it. In the case we have in mind, the

owner entered into a written contract with the contractor for the construction of a concrete driveway which was to be not less than 4 inches thick. In his suit the owner complained that the concrete work was improperly performed and that shortly after its completion cracks developed. He claimed that it would cost \$1000 to make repairs.

The contractor denied that the work was improperly done. Two witnesses who qualified as experts testified that there was nothing wrong with the concrete as to thickness or strength. They agreed that the cracks probably resulted from the lack of sufficient contraction joints, or from the failure to use reinforcing, or from the omission of a sand base beneath the slab.

The contractor testified that contraction joints were placed 20 to 25 feet apart as required by the local building code, and that the inclusion of reinforcing steel and a sand base were not required in residence



Suggesting the use of reinforcing can minimize a contractor's potential liability.

driveway work unless specified in the contract. He also testified that these precautions would not have prevented cracking, although he had advised the owner to authorize the use of wire fabric reinforcing. The owner denied that this suggestion had been made.

The owner recovered a judgment against the contractor in the trial court and the contractor appealed. In affirming the judgment of the lower court, the Appeals court apparently took the position that there is an implied warranty that the concrete work will be free of cracks unless the contract contains a "Contrary

intention"—that is, *no warranty* expressly stated.

Many contractors incorporate into their proposal forms quite specific disclaimers of implied warranties. Such disclaimers are intended to minimize potential liability and to discourage just such claims as the one under discussion. They do not, of course, relieve the contractor of the obligation to perform the contract in a workmanlike manner.

No two cases, especially involving building contracts, are ever exactly alike, and no doubt most concrete contractors will disagree with the court's

decision in this particular case. But the basic rule of implied warranty of fitness is generally applied to construction contracts. In the long run, of course, everyone is better off if the work is done in such a way as to prevent the occurrence of cracks. If the customer is properly sold in advance on the desirability of putting down a sand base and using reinforcing, he will usually not object to the somewhat greater cost which results. When he definitely rejects such measures, the terms of the contract should indicate this fact so that the omission cannot become a future issue. END

Both the home owner and the contractor have more to gain by good workmanship.

